CHEMICAL EMERGENCY PREPAREDNESS MEXICOS'S EXPERIENCE

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1. BACKGROUND

1.1 Disasters

Mexico's development in recent decades has brought an increase and diversification of activities, mainly in the large cities, and consequently, industrial growth has increasingly gone hand in hand with major advances in science and technology.

At the same time, this model of development has led to an alarming increase in industrial, urban, and rural accidents that have resulted in a degradation of the environment and, in certain cases, ecological imbalance and the loss of human lives.

Among these disasters mention must be made of forest fires, which produce serious ecological and economic losses, as evidenced in the 108,888 forest fires registered between 1970 and 1988--an average rate of 5,730 fires a year.

In regard to accidents stemming from the handling of hazardous substances, a sulfuric acid release in the refinery in Poza Rica, Veracruz, in 1950 caused the deaths of 22 people and the poisoning of 320 others; in 1981 the derailment of a train carrying chlorine caused 14 deaths and poisoned 1,000 in Cerritos, San Luis Potosí, necessitating the evacuation of 25,000 people; in 1984, the explosion and incineration of thousands of liters of natural gas caused the deaths of almost 500 people, in addition to heavy property losses in San Juan Ixhuatepec, in the State of Mexico; in that same year the remains of a cobalt-60 bomb were inadvertently melted down with scrap metal in a foundry in Ciudad Júarez, Chihuahua, causing serious health problems among several workers in the plant.

In March 1990, an overturned trailer transporting diaminotoluene caused the death of one person and the poisoning of 39 others in Matamoros, Tamaulipas. Finally, in 1992, in Guadalajara, Jalisco, an accumulation of hazardous substances in the sewerage system caused an explosion resulting in almost 200 lives lost and extensive material damage. These are only some of the more outstanding examples of chemical emergencies in Mexico.

It should also be noted that these kinds of problems, deriving from the handling of hazardous substances, have caused real tragedies in other countries, involving hundreds or thousands of deaths and enormous material and economic losses, as in the case of Sevesso, Italy, in 1976, Mississauga, Canada, in 1979, and Bophal, India, in 1984.

There has clearly been a marked increase in the magnitude and frequency of accidents caused by hazardous substances, a factor that has greatly enhanced the importance of civil protection agencies, particularly in cities with large industrial, commercial, and service facilities.

At the same time, there is an evident need to give priority to analyzing and assessing the environmental risk inherent in all current or projected work and activities with the potential for affecting the surrounding areas. High-risk activities are also a priority, due to the seriousness of their potential impact on ecological balance, the environment, and, accordingly, the human population.

1.2 The National Civil Protection System

As a result of the earthquakes of 19 and 20 September 1985, the Federal Executive Branch convened a group of citizens, called the National Reconstruction Commission. The Commission mapped

out the work of the Emergency Preparedness Committee, which in turn drafted the master document contained in the decree that paved the way for the National Civil Protection System, published in the Official Gazette of the Federation on 6 May 1986.

For the first time, a document presented civil protection as a rational series of actions designed to respond to the needs and demands of society in the face of a potential or real disaster that places the lives, property, and surroundings of its members at risk.

Under this concept, the basic objective of the System is "to protect individuals and society from disasters caused by natural or human agents through actions that reduce or preclude the loss of human lives, the destruction of material goods, and damage to nature."

In order to ensure fulfillment of this objective, the document highlighted three basic strategies:

- Articulation and coordination of civil protection policies between the various government levels and agencies--i.e., between the federal government and state and municipal governments, as well as between public offices and agencies at the same level.

- Timely organization of civil society, based on the principle of solidarity, to enlist and channel community participation.

- Clear-cut identification and delimitation of destructive phenomena, based on when and where they occur in the national territory, as indicated in the national risk atlas.

Under the terms of the decree that laid the foundations for the National Civil Protection System, chemical emergencies include fires, explosions, and mass poisonings resulting from the release of hazardous substances and radiation. Fires and explosions are given particular emphasis, since they are frequently the result industrial activity, which involves the widespread and varied use of hazardous substances.

As part of the development of the strategies listed above, the law creating the National Civil Protection Program 1990-1994 was published on 29 May 1991 in the Official Gazette of the Federation as the culmination of the work of a diverse group of institutions, agencies, groups, and individuals. Because of the growing importance of chemical emergencies, the text of the System included a subprogram that specifically addressed the topic, and, in recognition of this particular problem, formulated a number of specific proposals.

In order to meet the objectives and carry out proposals of the National Program System, particularly those relating to the subprogram on chemical emergencies, strategies were applied to bring about actions essentially focused on prevention, assistance, and recovery, as follows:

- Promotion of actions in national and local civil protection councils to respond to chemical disasters, stressing the allocation of skilled human resources and materials to civil protection units;

- Updating of the detected chemical phenomena noted in the national and local risk atlas, in addition to the establishment and operation of a specialized databank on the handling and control of hazardous substances;

- Ongoing promotion of awareness among the population concerning chemical substances, with special attention to high-risk areas, as part of the creation of a culture of civil protection;

- Promotion of a national and international exchange of knowledge, experience, and support in regard to chemical phenomena, with particular emphasis on the handling of hazardous substances and accidental emissions;

- Promotion of the preparation and enactment of federal and state regulations on chemical substances, as part of civil protection to deal with the disasters they may originate.

At the present time, consultation of the people in the preparation of the National Development Plan 1995-2000 has led to the inclusion of the Civil Protection Program in the Plan as one of the sectoral programs to be developed.

Thus, as a result of the consultation process and of the proposals formulated by a group of distinguished representatives from organized civil society, the Civil Protection Program 1995-2000 was drawn up to guide national activities in this context, with emphasis on:

- Strengthening the regulatory framework, coordination, and consensus-building between government levels and the various members of the National System, especially in regard to the planning of actions and public policies for prevention, assistance, and recovery in disasters, which is the joint responsibility of society and government.

- Strengthening teaching, training, and skill acquisition in the various disciplines involved in civil protection and supporting them with intensive mass communication efforts to strengthen the culture of civil protection, which is still in its infancy.

- Increasing the interaction of civil protection with other closely related processes, as part of planning. Such processes include urban, rural, and industrial development; ecology; health; education; and, generally speaking, all others associated with well-being and social development, in order to maximize the outcomes and the resources employed.

- Increasing the operating capacity of the National System so that responses to emergencies become more efficient, effective, and timely, and generally provide what the population expects in its need for protection against disasters.

- Promoting study, research, and technology development in civil protection and disaster prevention, uniting the efforts made in this regard by diverse institutions and individuals, which include the search for international cooperation to assist the National System in attaining its objectives.

2. PROBLEMS RELATED TO THE HANDLING OF HAZARDOUS SUBSTANCES

The main problem related to the handling of hazardous substances, insofar as the National Civil Protection System is concerned, is the containment of spills, leaks, explosions, fires, and radiation. Nevertheless, the very essence of the System demands that its actions be focused at all times on the production, use, transport, storage, and final disposal of such substances; the System's policies, strategies, and lines of action should therefore be broad enough to cover every possible contingency.

Most chemical disasters can be avoided if adequate preventive measures are adopted. Accordingly, the Federal Government, as part of the National Civil Protection Program 1990-1994, decided to integrate sectoral activities to solve this problem, ensuring that the legal norms in force would provide for the regulation and evaluation of industrial activities, with a view to preserving ecosystems and protecting the population.

In order to apply the appropriate strategies and meet the goals of the National Civil Protection Program and its program on chemical substances, the following lines of action were developed as the most efficient means of protecting the population and coping with chemical disasters.

Concerning coordination, consensus-building, and motivation, it was deemed essential to adopt a legal framework for civil protection that would pay particular attention to chemical substances in terms of prevention, assistance, and recovery, and also to establish mechanisms for ministering to relevant community needs and recognizing the responsibilities devolving from the above-mentioned productive processes as they relate to hazardous substances and their waste products.

Efforts were also made to promote and upgrade the training and development of the human resources responsible for the civil protection units and for enforcing and monitoring the current regulations on chemical phenomena and the handling of hazardous substances.

In the same context attempts were made to increase the participation of the agencies that authorize accident prevention programs in high-risk industrial, commercial, and service activities.

In this connection the preparation of lists of highly hazardous activities was continued, and the relevant sections of the national and local risk atlases were updated.

The coordination mechanisms of the entities that provide assistance to the population in the event of chemical disasters were also strengthened.

Agreement was reached on the links between the public, private, social, academic, and volunteer sectors that must be maintained in prevention, aid, and recovery activities in the event of chemical disasters, and on the prevention responsibilities of each sector.

As part of consensus-building, an attempt was made to incorporate research, technology, and training at all levels in the transportation, identification, and management of dangerous situations produced by hazardous substances.

Finally, the mass media were enlisted to ensure adequate dissemination of information to instill the adoption of self-care attitudes among the population and to conduct exercises and simulations to prepare the people for the eventuality of chemical emergencies.

3. ACTIONS OF THE NATIONAL CIVIL PROTECTION SYSTEM

In order to meet its basic objective, the National Civil Protection System, under the coordination of the Secretariat of the Interior, has carried out a number of activities relating to geological, hydrometeorological, chemical, sanitary, and socio-organizational phenomena, dividing them into five general categories:

- Organization;
- Equipment;
- Training and information dissemination;
- Establishment of the legal framework; and
- International information exchange.

Below is a brief explanation of the most important activities in each of the above-named categories with respect to chemical emergencies.

3.1 Organization

In December 1988 the Secretariat of the Interior created the Department of Civil Protection, Prevention, and Social Rehabilitation, the Directorate of Civil Protection, and the National Disaster Prevention Center as federal regulatory and management entities.

On 11 May 1990 an executive decree formally established the National Civil Protection Council as advisory and coordinating body, headed by the President of Mexico. This Council, in turn, has formed operational committees on aid and recovery and on external assistance to provide timely responses in disaster situations.

Local civil protection councils have been set up in the 31 states, 1,169 municipalities, and the Federal District and its 16 wards, each duplicating the organization and functions of the National Council in its own jurisdiction.

Thirty-two state civil protection units have been set up and made operational, in addition to units in the 100 cities with the greatest relative development (which include nearly 200 municipalities). Each unit has been provided with basic operational resources and is legally under the respective governments.

The federal government, in its central and parastate areas, and in the private banking system as well, has established internal civil protection committees and programs in 80 organizations in the Valley

of Mexico and in all of its installations throughout the country. In this regard it is important to note that these programs involve the detection and diagnosis of risks, the maintenance and adaptation of installations, the furnishing and equipping of real property, and the organization, training, and equipping of brigades to detect and fight fires.

In May 1994, as a result of a meeting convoked by the Secretariat of the Interior, the Advisory Commission on Community Participation in Civil Protection was installed, consisting of 60 distinguished personalities: leaders or the heads of civil organizations, representatives of the private and social sectors, academic institutions, political organizations, volunteer groups, neighborhood and nongovernmental organizations, and the mass media.

The Advisory Commission decided that two of its five working groups should address the problem of chemical emergencies, with one group focusing its work on fires, and the other on the handling of hazardous substances.

As a result, in October of that year, the Secretariat of the Interior was presented with a document that proposed planning, legal, and financial activities in areas the Commission considered necessary for enhancing the capabilities of the National System.

Given their importance, the ideas expressed in the document were incorporated into the National Civil Protection Program 1995-2000, and their application is supported by the personal and institutional commitment of the Commission's members.

Furthermore, as a result of consultations and consensus-building, distribution of the "Manual for the Organization and Operation of the National Civil Protection System" began in May 1994.

This important document spells out the responsibilities of each sector, government office, and public and private agency with regard to prevention, assistance, and recovery.

It also includes guidelines for shared responsibility with respect to the particular kinds of phenomena, subprograms, and functions in question, an outline of procedures, and flow charts that will ensure timely and effective action by the National System.

Thus, the preparation and implementation of special civil protection programs under the National System are currently contingent upon the guidelines contained in the Manual, as exemplified below.

In this context, and to ensure the safety of the population residing near the Laguna Verde nuclear power plant and comply with the national and international regulations prescribed in 1983, with special emphasis, however, on the provisions of the National System, the Secretariat of the Interior and a number of offices in the federal government and the State of Veracruz have been working since 1989 on an external plan for radiation emergencies.

Development of the plan and its procedures has involved an investment of resources in training and equipment, in addition to the conducting of partial and full-fledged exercises and simulations at both the cabinet and field levels.

It is important to mention the work to inform and train the community so that it will be in a position to act in a timely, coordinated, and orderly fashion in the event of an emergency.

Given the heavy concentration of population and industrial installations in the southern part of the State of Veracruz, the Secretariat of the Interior designed and implemented a special civil protection program in order to respond to the inherent risk that such a concentration implies.

This program involves government offices as well as industry and the population itself, and the commitment and resources of the government and business have made it possible to launch certain projects in Nanchital, slated for gradual extension to the rest of the area.

3.2 Equipment

The Secretariat of the Interior has installed a Communications and Information Science Center that is linked up with all the states in Mexico and the Department of the Federal District to ensure a permanent state of disaster preparedness.

To this end it has signed agreements with certain states, civic organizations, and chambers of industry in order to obtain access to databanks, advisory services, and equipment in the interests of maintaining ongoing communication, both in normal times and during emergencies.

Thus, with the recent incorporation of new technologies and human resources, the communication and information network of the National Civil Protection System offers the option of more rapid and efficient responses to problem related to the handling of hazardous substances.

3.3 Training and Information Dissemination

Since 1989 the Secretariat of the Interior has promoted meetings on special information and training topics at the national, regional, border, and local level. Special mention should be made of the four national civil protection culture weeks celebrated between 1993 to 1996, which attracted large numbers of people in both the Federal District and the interior of Mexico who were eager to receive knowledge and develop skills to improve their capabilities and performance.

In addition, many training activities, in the form of lectures and consensus-building, have been undertaken in coordination with the private and social sectors, as a means of indirectly reaching the population engaged in productive activities.

Training has also been provided for fire brigades, especially in 1992, through the assistance of French firefighters. This subsequently made it possible to send 17 people for specialized training in Pau, France.

The signing of agreements in 1993 with the Mexican Red Cross and the Mexican Federation of Ham Radio Operators has helped to provide specialized training for staff members working in offices in the Secretariat of the Interior as well as in other institutions in the National System.

In 1993 and 1994 the Secretariats of the Interior and of Social Development launched the disaster prevention and mitigation program through the urban development plan, which includes the municipal contingency plans and the 100 cities program.

In this strategy, five cities in Mexico representing several types of phenomena were selected. With respect to the handling of hazardous substances, the Secretariats worked with Querétaro and San Luis Potosí, in which hazards analysis and mapping were employed in the design of activities for inclusion in municipal contingency plans and in the formulation of the adaptations required for urban development plans and land use regulation.

In concluding this section, it is important to mention that the National System has sponsored a variety of mass communications activities throughout the nation involving television, radio, videos, posters, and pamphlets. In addition, substantial quantities of publications have been prepared, published, and distributed at the federal level, significantly:

- technical guidelines for the implementation of internal civil protection programs;
- guidelines for the implementation of municipal contingency plans;
- guidelines for the preparation of maps indicating the geographical location of potential disasters;
- the national risk atlas; and
- the national risk diagnosis.

3.4 Legal Framework

Pursuant to the National Civil Protection Program 1990-1994, the adoption of specific legal frameworks has been promoted in the states, 15 of which currently have legislation governing civil protection, 4 with specific regulations. The legal framework addresses the problem of the handling of hazardous substances.

The Secretariat of the Interior, through the Directorate of Civil Protection and the National Disaster Prevention Center, has signed a number of cooperation agreements designed to take advantage of the experience amassed by various public and private agencies in matters related to civil protection, which has made it possible to strengthen the capabilities of the National Civil Protection System.

In this same context, the Secretariat has drawn up and signed collaboration agreements with Mexican institutions of higher learning to ensure that the System bases its orientation and actions on the specific results of research on disasters.

The National Disaster Prevention Center, within the framework of cooperation agreements signed with various entities, has developed research projects that have considerably increased the safety of the

population. Similarly, it maintains ongoing communication with research institutions that operate monitoring networks and study hazardous situations.

In 1992, as a result of the chemical accident in Guadalajara, the Secretariats of the Interior and of Communications and Transportation speeded up efforts to draw up regulations that, beginning in March 1993, would govern the overland transport of hazardous substances and wastes. Subsequent efforts continued during 1994, 1995, and 1996; to date, 20 official regulations on the topic have been issued in Mexico.

In this regard, the Secretariat signed agreements with the National Association of the Chemical Industry (ANIQ) and with that association and the Secretariat of Communications and Transportation in 1993 and 1994, leading to the publication, distribution, specific training for, and use of a guide on first responses to problems stemming from the handling of hazardous substances. Closer ties have also been forged with local mutual aid committees (CLAM) and industrial mutual aid programs (PAMI) throughout the country.

These commitments have led to the design of the national emergency system for the transport of hazardous substances and wastes, which was provided for in the regulations, and to proposals for solutions to the problem of the handling of hazardous substances in Mexican ports.

Similarly, there was recent agreement on the use of a single version of the guide in Spanish, French, and English, which will be used simultaneously in the United States and Canada under NAFTA.

Furthermore, agreements signed in 1993 and 1996 with the National Chamber of the Manufacturing Industry (CANACINTRA) and the Confederation of Employers of the Mexican Republic (COPARMEX), respectively, have led to progress in implementing internal civil protection programs in the member companies, taking advantage of their technological capabilities to provide training in this area at the national level, instruction in the use of the first response guide, and the promotion of industrial response groups.

In a joint operation with the new Secretariat of the Environment, Natural Resources, and Fisheries, the Secretariat of the Interior published two lists of highly hazardous activities in 1990 and 1992 that refer, respectively, to toxic substances, and to flammable and explosive substances.

As a complementary activity, the Committee on Analysis and Approval of Accident Prevention Programs (COAAPPA) was set up in 1989. Since then it has been receiving, processing, and, when necessary, approving these kinds of documents, which, under the law on ecological balance and environmental protection, are required from companies utilizing the substances included in the lists. Work is currently under way to formulate the regulations for Committee activities.

In 1992, the Subcommittees on Supervision and Verification of Gas Installations (SPV) were organized in coordination with various federal offices and gas industries. At the present time, since responsibility for managing gas has been transferred from the Secretariat of Commerce and Industrial Promotion to the Secretariat of Energy, the commitments contained in the respective agreement are being reviewed.

3.5 International Information Exchange

The Secretariat of the Interior, in coordination with the Secretariat of Foreign Affairs, has signed technical cooperation agreements on civil protection for disaster prevention and the sharing of common solutions with the United States of America and Guatemala. Similar agreements have been signed with France to acquire knowledge and take advantage of that country's experiences in that area. Similar technical cooperation agreements have been signed in different areas related to civil protection with Japan, France, and the Confederation of Independent States [sic] to learn about and take advantage of the experiences of these countries.

More specifically, general mention must be made of the work of the Government of Mexico out with respect to the agreement on the control of cross-border movements of hazardous wastes and their disposal, adopted in Basel, Switzerland, in March 1989 and ratified by Mexico in February 1991.

In conclusion, mention must also be made of the agreement signed in 1993 between the Secretariat of the Interior and the World Environment Center (WEC), which has made it possible to take advantage of the facilities offered by that organization in terms of advisory services and training. This is particularly true of the APELL and LAMP systems, which have offered courses and workshops in Monterrey, in the State of Nuevo León, and Veracruz, Jalapa, Córdova, Coatzacoalcos, and Minatitlán, in the State of Veracruz.

These training activities prompted the Government of the State of Veracruz to sign its own agreement with that organization in light of the benefits received from the federal agreement.

4. CONCLUSIONS

As the present paper indicates, civil protection is moving forward and has been strengthened in Mexico because it has developed into a priority area that encompasses all kinds of experiences, tendencies, and interests, owing to its commitment to protect human life.

Nevertheless, as important as it is to reflect on what has been accomplished, it is more important to look toward the future and to map out the roads that must be traveled in order to consolidate achievements, establish new goals, and project civil protection toward the twenty-first century.

The modernization of Mexico and concepts like "total quality" and "competitiveness" require that current objectives be attained without compromising the future and the viability of new generations.

In this context, civil protection has much to offer, particularly for creating and instilling individual and collective awareness of prevention, focused not only on natural or man-made disasters, but on encouraging safe practices at all levels by all people.

Creating such an awareness, however, entails the adoption of new individual, family, community, and work ethics that assume a explicit commitment to participation, and, in this specific subject area, the emergence of new forms of behavior, committed to safety in all environments by all people.

This is the long-term challenge before us, a challenge to which we and those who succeed us must be committed in order to attain the goal of the National Civil Protection System.